

What is claimed:

1. Particles in powder form for use as a phosphor, each particle comprising

(a) an emitting material that can emit visible light in response to direct excitation caused by electrons operating at low voltage, and

5 (b) an electrically conducting, visible light transmitting material disposed on said emitting material to provide an electrical pathway across said particle.

2. The particles of claim 1 wherein said particles are selected from the group consisting of microparticles, nanoparticles, and mixtures thereof, and thickness of said conductive material is 0.5-50 nm.

10 3. The particles of claim 1 wherein size of said particles is selected from the group consisting of 0.5-20 microns and 0.5-20 nm, and thickness of said conducting material is 1-10 nm.

4. The particles of claim 2 including an electrically nonconducting barrier material disposed on said emitting material beneath said conducting material, wherein size of said particles is selected from the group consisting of 1-10 microns and 1-10 nm.

15 5. The particles of claim 4 wherein said barrier material is disposed beneath said conducting material, said barrier material has thickness of 0.5-50nm.

6. The particles of claim 5 wherein said conducting material forms a continuous coating on each of said particles and said barrier material has thickness of 1-10 nm.

20 7. The particles of claim 5 wherein said emitting material is selected from the group consisting of ZnS:Ag,Cl, ZnS:Mn, ZnS:Cu, thiogallates, SrS:Ce, SrS:Eu, Y_2O_3 :Eu, Y_2O_3 S:Eu, and mixtures thereof; wherein said barrier material is selected from the group consisting of silica, magnesia, alumina and mixtures thereof; and wherein said conducting material is selected from the

group consisting of silver, gold, palladium, zinc, indium, aluminum, indium oxide, tin oxide, indium tin oxide, zinc oxide, and mixtures thereof.

8. An electrically conducting film comprising a matrix and particles of claim 1 dispersed in said matrix.

5 9. The film of claim 8 wherein said matrix comprises an oxide.

10. The film of claim 9 wherein said matrix is selected from the group consisting of indium oxide, tin oxide, zinc oxide, indium tin oxide, and mixtures thereof; size of said particle is 0.5-20 nm; and said emitting material is selected from the group consisting of ZnS:Ag,Cl, ZnS:Mn, ZnS:Cu, thiogallates, SrS:Ce, SrS:Eu, Y_2O_3 :Eu, Y_2O_3 S:Eu, and mixtures thereof.

10 11. The film of claim 10 wherein each of said particles is coated with a barrier material selected from the group consisting of silica, magnesia, alumina, and mixtures thereof.

12. The film of claim 11 having thickness of 1-20 microns when the embedded phosphors are microphosphors and the film thickness is about 10-5,000 nm when the embedded phosphors are nanophosphors.

15 13. A field emission device comprising a phosphor screen, electron field emitters spaced from said phosphor screen, and an electrical source for imparting sufficient electrical power to cause electrons to move from said field emitters toward said phosphor screen whereby light emission takes place on direct excitation of said phosphor screen by the electrons emanating from said field emitters, said phosphor screen comprising a plurality of precoated phosphor particles each having
20 electrically conducting material predisposed thereon to provide an electrical path across said particles.

14. The device of claim 13 wherein said electrical source imparts a low voltage differential

between said field emitters and said phosphor screen.

15. The device of claim 14 wherein size of said phosphor particles is selected from the group consisting of microparticles, nanoparticles, and mixtures thereof, and thickness of said conducting material disposed on said particles is 0.5-50 nm.

5 16. The device of claim 14 wherein size of said phosphor particles is selected from the group consisting of 0.5-20 microns and 0.5-20 nm, wherein thickness of said conducting material disposed on said particles is 1-10 nm, and wherein the light emission is that of visible light.

17. The device of claim 15 wherein said phosphor particles include an electrically nonconducting barrier material below said conducting material and wherein size of said phosphor particles is selected from the group consisting of 1-10 microns and 1-10 nm.

18. The device of claim 17 wherein said barrier material has a wide band and its thickness is 1-10 nm.

19. The device of claim 18 wherein said emitting material is selected from the group consisting of ZnS:Ag,Cl, ZnS:Mn, , ZnS:Cu, thiogallates, $Y_2O_3:Eu$, $Y_2O_3S:Eu$, and mixtures thereof; wherein said conducting material is selected from the group consisting of silver, gold, palladium, zinc, indium, aluminum, zinc oxide, indium tin oxide, indium oxide, tin oxide, and mixtures thereof; and wherein said barrier material is selected from the group consisting of silica, alumina, magnesia, and mixtures thereof.

20. The device of claim 19 wherein said electrical source imparts a voltage differential of 100-10,000 volts between said field emitters and said phosphor screen.